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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/791,401

03/02/2004

Yuzuru Fukushima

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08/29/2008

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EXAMINER

ALEJANDRO, RAYMOND

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/791,401	<b>Applicant(s)</b> FUKUSHIMA ET AL.	
	<b>Examiner</b> Raymond Alejandro	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-10 and 12-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-10 and 12-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

This office action is submitted in reply to the amendment filed by the applicant on 07/10/08. The art rejections as previously applied in the prior office action have been overcome by the applicant. Refer to the abovementioned amendment for specific details concerning applicant's rebuttal arguments and remarks. Nonetheless, all pending claims are finally rejected over newly discovered references as composed hereinbelow and for the reasons of record:

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-3, 5-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese publication JP 2002-15771 (heretofore the JP'771) in view of Pugh et al 2005/0181283.

The objective of the present application is aimed at an electrolyte wherein the disclosed inventive concept comprises the specific electrolyte composition.

As to claims 1 and 8:

The JP'771 discloses a non-aqueous electrolyte secondary cell and a non-aqueous electrolyte (TITLE). The cell comprises a positive electrode, a negative electrode and a non-aqueous electrolyte (P0045-0046, 0014, 0065, 0074/Abstract/CLAIM 7). The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinyl ethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). Specifically, the JP'711 is concerned with a mixture of multiple solvents including a 4<sup>th</sup> and/or 5<sup>th</sup> component (CLAIMS 1-3). VEC can be the 5<sup>th</sup> component (P0130).

*(Emphasis added→)* The JP'771 discloses the use of a gelled polymer electrolyte holding the electrolyte containing the electrolyte solution comprising solvents (P0040, 0056-0057, 0006, 0154). Additionally, disclosed therein is the use of at least ethylene carbonate (EC) and propylene carbonate (PC) in a combined amount of up to 85 % vol. (ABSTRACT, P0009, 0013,

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0015, 0018, 0036, 0100-0101, CLAIM 1). *EC and PC are recognized in the art as high dielectric constant solvents.*

The electrolyte solution comprises solvents and a Li-salt such as LiClO<sub>4</sub> (P 0131 & 0096).

**Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylene carbonate (VEC) ranges from 0.5-5 % (See TABLE 5). Further disclosed is the specific reasons for adding vinylene carbonate in the specified amount (P104, 0125). *Thus, the JP'771 teaches the claimed wt % range of VEC with sufficient specificity.*

Additionally, it is disclosed the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

**Two approaches:**

- *the JP'771 discloses the claimed high molecular weight compound because it at once envisages combining an additional 4<sup>th</sup> and/or 5<sup>th</sup> component. In this case, either the 4<sup>th</sup> or the 5<sup>th</sup> component represents the high molecular weight compound.*
- *The JP'771 meet the claimed requirement because it discloses the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057)*

As to claims 2 and 9:

**EXAMPLE 39**, among other, in **TABLE 5** shows about 50:50 % ratio of EC and PC. Other examples (See **EXAMPLES 35-38 and 40-44**) also show EC/PC ratio within the claimed ratio range.

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As to claims 5 and 12:

The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinylethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). **Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylethylene carbonate ranges from 0.5-5 % (See TABLE 5).

As to claims 6-7 and 13-14:

Disclosed is the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

The JP'771 describes a battery comprising an electrolyte system as disclosed hereinabove. However, the preceding prior art reference does not expressly disclose the specific lithium salt and the specific weight percent of the high dielectric constant solvent.

Pugh et al disclose batteries comprising preferred electrolyte systems (TITLE) including a solid polymer electrolyte made up of a solid polymer matrix and a salt dispersed via a solvent in the matrix. Suitable polymeric matrices include organic/inorganic polymers (P0178); a variation of a polymer, solvent and salt together forming a gel (P0179). The electrolytes comprise a salt dissolved in a mixture of a carbonate; such a salt is a lithium salt such as LiAlCl<sub>4</sub> and/or LiN(C<sub>2</sub>F<sub>5</sub>SO<sub>2</sub>)<sub>2</sub>, among others and mixtures thereof (P0180).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific lithium salt of Pugh et al in the electrolyte system of the JP'771 as Pugh et al teach that the disclosed electrolytes are preferred

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electrolyte systems for batteries because they provide suitable ionic conductivity between electrodes, and they are capable of maintaining the electrodes spaced apart in a mechanically and chemically stable fashion.

As to the specific weight percent of the high dielectric constant solvent, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific weight percent of the high dielectric constant solvent in the electrolyte solution as instantly claimed or any other amount of those high dielectric constant solvents as the JP'771 itself discloses that charging/discharging cycle, viscosity and ionic conductivity properties (*See JP'771 at paragraphs 0100-0101 & 0003*) are affected when the amount or content of high dielectric constant solvents in the electrolyte solution is varied or changed. Thus, the JP'771 recognizes the specific weight percent of the high dielectric constant solvents in the electrolyte solution as a variable that achieves a recognized result (*i.e. capable of varying the charge/discharge cycle, viscosity and ionic conductivity characteristics*) *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382; and *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Hence, it is prima-facie obvious to select an optimized weight of the high dielectric constant solvents in the electrolyte solution in order to obtain an electrolyte solution exhibiting suitable charging/discharging, viscous and ionic conductive properties. Additionally, generally speaking, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454,

456, 105 USPQ 233, 235 (CCPA 1955). Thus, it is prima-facie obvious to choose or select the specific amount of the high dielectric constant solvents. ***See MPEP 2144.05 Obviousness of Ranges.***

5. Claims 1-3, 5-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese publication JP 2002-15771 (heretofore the JP'771) in view of Swoyer et al 2006/0014078.

The objective of the present application is aimed at an electrolyte wherein the disclosed inventive concept comprises the specific electrolyte composition.

As to claims 1 and 8:

The JP'771 discloses a non-aqueous electrolyte secondary cell and a non-aqueous electrolyte (TITLE). The cell comprises a positive electrode, a negative electrode and a non-aqueous electrolyte (P0045-0046, 0014, 0065, 0074/Abstract/CLAIM 7). The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinylethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). Specifically, the JP'711 is concerned with a mixture of multiple solvents including a 4<sup>th</sup> and/or 5<sup>th</sup> component (CLAIMS 1-3). VEC can be the 5<sup>th</sup> component (P0130).

(***Emphasis added***→) The JP'771 discloses the use of a gelled polymer electrolyte holding the electrolyte containing the electrolyte solution comprising solvents (P0040, 0056-0057, 0006, 0154). Additionally, disclosed therein is the use of at least ethylene carbonate (EC) and propylene carbonate (PC) in a combined amount of up to 85 % vol. (ABSTRACT, P0009, 0013,



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0015, 0018, 0036, 0100-0101, CLAIM 1). *EC and PC are recognized in the art as high dielectric constant solvents.*

The electrolyte solution comprises solvents and a Li-salt such as LiClO<sub>4</sub> (P 0131 & 0096).

**Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylene carbonate (VEC) ranges from 0.5-5 % (See TABLE 5). Further disclosed is the specific reasons for adding vinylene carbonate in the specified amount (P104, 0125). *Thus, the JP'771 teaches the claimed wt % range of VEC with sufficient specificity.*

Additionally, it is disclosed the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

**Two approaches:**

- *the JP'771 discloses the claimed high molecular weight compound because it at once envisages combining an additional 4<sup>th</sup> and/or 5<sup>th</sup> component. In this case, either the 4<sup>th</sup> or the 5<sup>th</sup> component represents the high molecular weight compound.*
- *The JP'771 meet the claimed requirement because it discloses the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057)*

As to claims 2 and 9:

**EXAMPLE 39**, among other, in **TABLE 5** shows about 50:50 % ratio of EC and PC. Other examples (See **EXAMPLES 35-38 and 40-44**) also show EC/PC ratio within the claimed ratio range.

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As to claims 5 and 12:

The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinylethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). **Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylethylene carbonate ranges from 0.5-5 % (See TABLE 5).

As to claims 6-7 and 13-14:

Disclosed is the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

The JP'771 describes a battery comprising an electrolyte system as disclosed hereinabove. However, the preceding prior art reference does not expressly disclose the specific lithium salt and the specific weight percent of the high dielectric constant solvent.

Swoyer et al disclose electrolyte systems for use in batteries (Abstract) wherein the electrolyte system contains organic solvents and a lithium salt selected from  $\text{LiAlCl}_4$ , and other other Li-salts and mixture thereof (CLAIM 32). The electrolyte system provides for transfer of ions between the cathode and anode (P0004).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific lithium salt of Swoyer et al in the electrolyte system of the JP'771 as Swoyer et al teach that the disclosed electrolytes provide for transfer of ions between the cathode and anode. Therefore, the disclosed electrolyte systems are preferable for batteries because they provide suitable ionic conductivity between electrodes.

As to the specific weight percent of the high dielectric constant solvent, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific weight percent of the high dielectric constant solvent in the electrolyte solution as instantly claimed or any other amount of those high dielectric constant solvents as the JP'771 itself discloses that charging/discharging cycle, viscosity and ionic conductivity properties (*See JP'771 at paragraphs 0100-0101 & 0003*) are affected when the amount or content of high dielectric constant solvents in the electrolyte solution is varied or changed. Thus, the JP'771 recognizes the specific weight percent of the high dielectric constant solvents in the electrolyte solution as a variable that achieves a recognized result (*i.e. capable of varying the charge/discharge cycle, viscosity and ionic conductivity characteristics*) *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382; and *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Hence, it is prima-facie obvious to select an optimized weight of the high dielectric constant solvents in the electrolyte solution in order to obtain an electrolyte solution exhibiting suitable charging/discharging, viscous and ionic conductive properties. Additionally, generally speaking, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Thus, it is prima-facie obvious to choose or select the specific amount of the high dielectric constant solvents. ***See MPEP 2144.05 Obviousness of Ranges.***

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6. Claims 1-3, 5-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese publication JP 2002-15771 (heretofore the JP'771) in view the Japanese publication JP 2001-057234 (herein called the JP'234), and further in view of Pugh et al 2005/0181283.

The objective of the present application is aimed at an electrolyte wherein the disclosed inventive concept comprises the specific electrolyte composition.

As to claims 1 and 8:

The JP'771 discloses a non-aqueous electrolyte secondary cell and a non-aqueous electrolyte (TITLE). The cell comprises a positive electrode, a negative electrode and a non-aqueous electrolyte (P0045-0046, 0014, 0065, 0074/Abstract/CLAIM 7). The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinyl ethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). Specifically, the JP'771 is concerned with a mixture of multiple solvents including a 4<sup>th</sup> and/or 5<sup>th</sup> component (CLAIMS 1-3). VEC can be the 5<sup>th</sup> component (P0130).

*(Emphasis added→)* The JP'771 discloses the use of a gelled polymer electrolyte holding the electrolyte containing the electrolyte solution comprising solvents (P0040, 0056-0057, 0006, 0154). Additionally, disclosed therein is the use of at least ethylene carbonate (EC) and propylene carbonate (PC) in a combined amount of up to 85 % vol. (ABSTRACT, P0009, 0013, 0015, 0018, 0036, 0100-0101, CLAIM 1). *EC and PC are recognized in the art as high dielectric constant solvents.*

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The electrolyte solution comprises solvents and a Li-salt such as LiClO<sub>4</sub> (P 0131 & 0096).

**Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylethylene carbonate (VEC) ranges from 0.5-5 % (See TABLE 5). Further disclosed are the specific reasons for adding vinylethylene carbonate in the specified amount (P104, 0125). *Thus, the JP'771 teaches the claimed wt % range of VEC with sufficient specificity.*

Additionally, it is disclosed the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

**Two approaches:**

- *the JP'771 discloses the claimed high molecular weight compound because it at once envisages combining an additional 4<sup>th</sup> and/or 5<sup>th</sup> component. In this case, either the 4<sup>th</sup> or the 5<sup>th</sup> component represents the high molecular weight compound.*
- *The JP'771 meet the claimed requirement because it discloses the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057)*

As to claims 2 and 9:

**EXAMPLE 39**, among other, in **TABLE 5** shows about 50:50 % ratio of EC and PC. Other examples (See **EXAMPLES 35-38 and 40-44**) also show EC/PC ratio within the claimed ratio range.

As to claims 5 and 12:

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The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinylethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). **Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylethylene carbonate ranges from 0.5-5 % (See TABLE 5).

As to claims 6-7 and 13-14:

Disclosed is the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

The JP'771 describes a battery comprising an electrolyte system as disclosed hereinabove. However, the preceding prior art reference does not expressly disclose the specific weight percent of the high dielectric constant solvent.

The JP'234 discloses a non-aqueous electrolyte and a non-aqueous electrolyte secondary battery wherein the non-aqueous electrolyte is composed of 95 wt % of cyclic carbonate solvents such as propylene carbonate (PC) and/or ethylene carbonate (EC) (P0025-0026, 0003, Abstract) to improve the life of a battery and the leakage current value (ABSTRACT). *EC and PC are recognized in the art as high dielectric constant solvents.* JP'234 also discloses LiClO<sub>4</sub> (P0003 & 0021).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific weight percent of the high dielectric constant solvent of the JP'234 in the electrolyte solution of the JP'771 because the

JP'234 teaches that such an amount (weight percent) of the high dielectric constant solvent in the electrolytic solution allows to improve the life of a battery and the leakage current value.

Moreover, both the JP'771 and the JP'234 discloses that charging/discharging cycle, viscosity and ionic conductivity properties (*See JP'771 at paragraphs 0100-0101 & 0003*) and/or the life of a battery and the leakage current value (*See JP'237 at P0025-0026, 0003, Abstract*) are controlled or affected when the amount or content of high dielectric constant solvents in the electrolyte solution is varied or changed. Thus, both the JP'771 and the JP'234 recognize the specific weight percent of the high dielectric constant solvents in the electrolyte solution as a variable that achieves a recognized result (*i.e. capable of varying the charge/discharge cycle, viscosity and ionic conductivity characteristics; and/or batter life and leakage current value*) *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382; and *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Hence, it is prima-facie obvious to select an optimized weight of the high dielectric constant solvents in the electrolyte solution in order to obtain an electrolyte solution exhibiting suitable charging/discharging, viscous and ionic conductive properties. Additionally, generally speaking, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Thus, it is prima-facie obvious to choose or select the specific amount of the high dielectric constant solvents. ***See MPEP 2144.05 Obviousness of Ranges.***

Additionally, none of the preceding references clearly teaches the specific lithium salt.

However, Pugh et al disclose batteries comprising preferred electrolyte systems (TITLE) including a solid polymer electrolyte made up of a solid polymer matrix and a salt dispersed via a solvent in the matrix. Suitable polymeric matrices include organic/inorganic polymers (P0178); a variation of a polymer, solvent and salt together forming a gel (P0179). The electrolytes comprise a salt dissolved in a mixture of a carbonate; such a salt is a lithium salt such as LiAlCl<sub>4</sub> and/or LiN(C<sub>2</sub>F<sub>5</sub>SO<sub>2</sub>)<sub>2</sub>, among others and mixtures thereof (P0180).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific lithium salt of Pugh et al in the electrolyte system of the JP'771 and the JP'234 as Pugh et al teach that the disclosed electrolytes are preferred electrolyte systems for batteries because they provide suitable ionic conductivity between electrodes, and they are capable of maintaining the electrodes spaced apart in a mechanically and chemically stable fashion.

7. Claims 1-3, 5-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese publication JP 2002-15771 (heretofore the JP'771) in view the Japanese publication JP 2001-057234 (herein called the JP'234), and further in view of Swoyer et al 2006/0014078.

The objective of the present application is aimed at an electrolyte wherein the disclosed inventive concept comprises the specific electrolyte composition.

As to claims 1 and 8:



The JP'771 discloses a non-aqueous electrolyte secondary cell and a non-aqueous electrolyte (TITLE). The cell comprises a positive electrode, a negative electrode and a non-aqueous electrolyte (P0045-0046, 0014, 0065, 0074/Abstract/CLAIM 7). The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinylethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). Specifically, the JP'771 is concerned with a mixture of multiple solvents including a 4<sup>th</sup> and/or 5<sup>th</sup> component (CLAIMS 1-3). VEC can be the 5<sup>th</sup> component (P0130).

*(Emphasis added→)* The JP'771 discloses the use of a gelled polymer electrolyte holding the electrolyte containing the electrolyte solution comprising solvents (P0040, 0056-0057, 0006, 0154). Additionally, disclosed therein is the use of at least ethylene carbonate (EC) and propylene carbonate (PC) in a combined amount of up to 85 % vol. (ABSTRACT, P0009, 0013, 0015, 0018, 0036, 0100-0101, CLAIM 1). *EC and PC are recognized in the art as high dielectric constant solvents.*

The electrolyte solution comprises solvents and a Li-salt such as LiClO<sub>4</sub> (P 0131 & 0096).

**Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylethylene carbonate (VEC) ranges from 0.5-5 % (See TABLE 5). Further disclosed are the specific reasons for adding vinylethylene carbonate in the specified amount (P104, 0125). *Thus, the JP'771 teaches the claimed wt % range of VEC with sufficient specificity.*

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Additionally, it is disclosed the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

**Two approaches:**

- *the JP'771 discloses the claimed high molecular weight compound because it at once envisages combining an additional 4<sup>th</sup> and/or 5<sup>th</sup> component. In this case, either the 4<sup>th</sup> or the 5<sup>th</sup> component represents the high molecular weight compound.*
- *The JP'771 meet the claimed requirement because it discloses the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057)*

As to claims 2 and 9:

**EXAMPLE 39**, among other, in **TABLE 5** shows about 50:50 % ratio of EC and PC.

Other examples (See **EXAMPLES 35-38 and 40-44**) also show EC/PC ratio within the claimed ratio range.

As to claims 5 and 12:

The electrolyte comprises a mixture of solvents including ethylene carbonate (EC), propylene carbonate (PC),  $\gamma$ -butyrolactone (BL), vinylethylene carbonate (VEC), vinylene carbonate, ethylene sulfate, phenylethylene carbonate, tetraethylene glycol dimethyl ether (ABSTRACT/P0099, 0100, 0101). **Table 5** shows an electrolyte solution comprising EC, PC, BL and VEC, wherein the weight percent of vinylethylene carbonate ranges from 0.5-5 % (See TABLE 5).

As to claims 6-7 and 13-14:

Disclosed is the use of polyacrylonitrile (PAN) or polyvinylidene fluoride (PVdF) in the non-aqueous electrolyte (P0057, 0154).

The JP'771 describes a battery comprising an electrolyte system as disclosed hereinabove. However, the preceding prior art reference does not expressly disclose the specific weight percent of the high dielectric constant solvent.

The JP'234 discloses a non-aqueous electrolyte and a non-aqueous electrolyte secondary battery wherein the non-aqueous electrolyte is composed of 95 wt % of cyclic carbonate solvents such as propylene carbonate (PC) and/or ethylene carbonate (EC) (P0025-0026, 0003, Abstract) to improve the life of a battery and the leakage current value (ABSTRACT). *EC and PC are recognized in the art as high dielectric constant solvents.* JP'234 also discloses LiClO<sub>4</sub> (P0003 & 0021).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific weight percent of the high dielectric constant solvent of the JP'234 in the electrolyte solution of the JP'771 because the JP'234 teaches that such an amount (weight percent) of the high dielectric constant solvent in the electrolytic solution allows to improve the life of a battery and the leakage current value.

Moreover, both the JP'771 and the JP'234 discloses that charging/discharging cycle, viscosity and ionic conductivity properties (*See JP'771 at paragraphs 0100-0101 & 0003*) and/or the life of a battery and the leakage current value (*See JP'237 at P0025-0026, 0003, Abstract*) are controlled or affected when the amount or content of high dielectric constant solvents in the electrolyte solution is varied or changed. Thus, both the JP'771 and the JP'234 recognize the specific weight percent of the high dielectric constant solvents in the electrolyte

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solution as a variable that achieves a recognized result (*i.e. capable of varying the charge/discharge cycle, viscosity and ionic conductivity characteristics; and/or batter life and leakage current value*) *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382; and *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Hence, it is prima-facie obvious to select an optimized weight of the high dielectric constant solvents in the electrolyte solution in order to obtain an electrolyte solution exhibiting suitable charging/discharging, viscous and ionic conductive properties. Additionally, generally speaking, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Thus, it is prima-facie obvious to choose or select the specific amount of the high dielectric constant solvents. ***See MPEP 2144.05 Obviousness of Ranges.***

Additionally, none of the preceding references clearly teaches the specific lithium salt.

Swoyer et al disclose electrolyte systems for use in batteries (Abstract) wherein the electrolyte system contains organic solvents and a lithium salt selected from LiAlCl<sub>4</sub>, and other Li-salts and mixture thereof (CLAIM 32). The electrolyte system provides for transfer of ions between the cathode and anode (P0004).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of the invention to employ the specific lithium salt of Swoyer et al in the electrolyte system of the JP’771 and the JP’234 as Swoyer et al teach that the disclosed

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electrolytes provide for transfer of ions between the cathode and anode. Therefore, the disclosed electrolyte systems are preferable for batteries because they provide suitable ionic conductivity between electrodes.

### ***Response to Arguments***

8. Applicant's arguments with respect to all pending claims have been considered but are moot in view of the new ground(s) of rejection.

9. With respect to applicant's arguments that the art of record lacks one of the specific Li-salts of independent claims 1 and 8, the examiner simply points out that the JP'771 discloses electrolyte solution comprising solvents and a Li-salt such as LiClO<sub>4</sub> (P 0131 & 0096); additionally secondary reference JP'234 also discloses LiClO<sub>4</sub> in paragraph 0003 and 0021. Therefore, applicant is incorrect when he/she asserts that one of the Li-salts incorporated into claims 1 and 8 is not taught by the art of record.

10. As for applicant's arguments against the JP'771, individually or in combination, it is contended that the high chemical stability and high capacity leading to less swelling of the container attributable to the specific weight ratio of ethylene and propylene carbonate in addition to vinyl ethylene carbonate is also attained in the electrolyte and battery system of the prior art because the art of record discloses the same electrolyte system (components) in a substantially similar mixed amount. In fact, the JP'771, when taken alone, shows an amount of up 85 % volume which is close enough to applicant's claimed range; on the other hand, the JP'771 in combination with JP'234 shows specifically the same electrolyte composition in terms of both components and specific weight content. Therefore, both electrolytes (JP'771, individually; or

the JP'771 in combination with JP'234) are capable of behaving in the same manner that applicant's electrolyte composition does for purposes of swelling, capacity and/or chemical stability. So far, applicant has not come forward with objective, sound or scientific evidence demonstrating that his/her electrolyte composition exhibits superior characteristics when compared to the electrolyte composition of the prior art. Burden of proof is on applicant. A vis-à-vis comparison between the disclosed electrolyte system and applicant's electrolyte system to show the existence of significantly statistical difference, if any, has not been presented for a factual determination of patentability.

To further support the position taken by the Examiner, it is noted that both the JP'771 and the JP'234 recognize the specific weight percent of the high dielectric constant solvents in the electrolyte solution as a variable that achieves a recognized result (*i.e. capable of varying the charge/discharge cycle, viscosity and ionic conductivity characteristics; and/or batter life and leakage current value*) In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382; and In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). Hence, it is prima-facie obvious to select an optimized weight of the high dielectric constant solvents in the electrolyte solution in order to obtain an electrolyte solution exhibiting suitable charging/discharging, viscous and ionic conductive properties.

Additionally, generally speaking, differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Thus, it is

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prima-facie obvious to choose or select the specific amount of the high dielectric constant solvents. *See MPEP 2144.05 Obviousness of Ranges.*

### ***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Raymond Alejandro/  
Primary Examiner, Art Unit 1795